

MEMORANDUM



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INSIGHTFUL ENVIRONMENTAL SOLUTIONS™

Date: April 1, 2004
To: Keith Piontek
From: Matt Shurtliff
Subject: AEHS VI Attenuation Conference Summary

INTRODUCTION

The U.S. Environmental Protection Agency (USEPA) Office of Solid Waste and Emergency Response (OSWER) held a workshop on subsurface vapor-to-indoor-air attenuation factors at the 14th Annual AEHS West Coast Conference on Contaminated Soils (March 15-18, 2004, San Diego, CA).

USEPA's goal for the conference was to assemble the "best in vapor intrusion" from across the country to focus primarily on the observations of vapor intrusion attenuation factors from across the country, and to use recently obtained vapor intrusion field measurements to evaluate the screening levels provided in OSWER's Draft Subsurface Vapor Intrusion (SVI) Guidance (USEPA, November 1992). The conference was hosted by Henry Schuver, who is leading OSWER's response to comments on the Draft SVI guidance.

Complete copies of all workshop materials and presentations are available at <http://iavi.rti.org>.

WORKSHOP PURPOSE

USEPA's stated purpose for the workshop was:

- Focus on scientific observations of the physical phenomena of attenuation, and specifically, field attenuation factors (defined as the ratio of concentration in indoor air to concentration in measured media) for groundwater, deep soil gas, shallow soil gas, as sub-slab soil gas to indoor air.
- Bring in the best available field observations of attenuation factors from around the world.
- Perform the best possible analysis of available data
- Make comparisons to the attenuation factors used in developing the SVI Guidance generic screening criteria, and provide recommendations for improving the screening process.

Other major topics of conversation included:

- Observations from those performing vapor phase investigations across the nation on differentiating impacts from vapor phase intrusion from other sources that result in indoor air impacts.
- Review of existing SVI investigation techniques and data approaches to determine the best currently available approaches to assessing SVI.



- Discussion of the regulatory “path forward” with SVI.

The following sections discuss major elements of the workshop.

ATTENUATION FACTORS

Data was presented from multiple SVI investigations from across the country. The following conclusions on the attenuation factors (AF) currently used in the SVI Guidance were summarized by Henry Schuver and reflect consensus opinion developed from the presentations, questions and responses, and panel discussions conducted during the workshop:

- Sub-slab Soil Gas: The guidance AF of 0.1 appears to be too conservative. USEPA suggests that values of 0.05 to 0.01 are more appropriate, which would result in higher screening concentrations.
- Shallow Soil Gas: These data are highly variable. The existing AF of 0.1 seems to be a reasonable upper bound.
- Deep Soil Gas: The guidance AF of 0.01 appears to be slightly over-conservative. Site specific studies suggest that a value of 0.005 may be more appropriate, which would result in higher screening concentrations.
- Groundwater: The guidance AF of 0.001 appears to be too conservative (i.e., screening values should be lower). USEPA considers it an “upper bound” value; however, site specific studies presented at the conference reported measured values as low as 10^{-7} . This could result in higher groundwater screening concentrations.

DIFFERENTIATION FROM BACKGROUND SOURCES

Petroleum Sites

It has proven to be extremely difficult (some say “impossible”) to differentiate the impacts of SVI from other sources. Mr. Ian Hers of Golder Associates remarked that we “... almost never will be able to measure significant vapor intrusion for BTEX relative to background.”

Chlorinated Solvent Sites

Valid approaches have been developed to differentiate indoor air constituents and concentrations resulting from vapor intrusion from other sources:

- Real time data collection to assess diurnal concentration patterns.
- Comparison of ratios of the concentrations of detected impacts in indoor air to those in subsurface sources.
- Mass balance assessments of indoor air, outdoor air, and sub-slab soil gas samples.



- Assessment of certain “tracer” compounds typically not associated with other sources that may be present in indoor air (e.g., radon, 1,1-DCE).
- Soil gas data is “all over the map” – the most useful data appears to be sub-slab soil gas data.

All approaches require more intensive data collection than has been performed in typical historical SVI investigations. The approaches allow you to see the whole picture, but can be resource intensive.

FIELD ASSESSMENT TECHNIQUES

Sub-slab soil gas sampling is the clearest indicator of the potential for SVI that is currently available. USEPA and others are developing a recommended sampling protocol that is gaining acceptance. USEPA recommends 3 subsoil samples for the target structure under assessment.

Field techniques for soil gas sampling are highly variable. Some believe that sampling points should be installed exactly as monitoring wells are installed, with screens and filter packs at the target interval and the typical sealing mechanisms above. For rod-driven sample collection (i.e., Geoprobe), care should be taken to ensure a surface seal so that ambient air isn’t drawn into the sample.

There was significant interest in developing a standard “toolbox” approach for site investigation approaches at SVI sites.

DATA REVIEW TECHNIQUES

Assessment of site specific data is highly variable. There was significant interest in developing a standard “toolbox” approach for evaluating data SVI sites.

FUTURE DIRECTION

Following the technical presentations, Henry Shuver gave a presentation titled “The Broader Context,” in which he discussed USEPA’s current thinking on vapor intrusion. USEPA recognizes that the guidance currently is “screening in” nearly every site to a vapor phase assessment, which results in unnecessary expenditures. USEPA stated that efforts spent at screened-in sites that DO NOT lead to reductions in exposures could be spent more beneficially elsewhere.

Mr. Shuver proposed a concept that SVI exposure should not cause higher exposures than otherwise unavoidable exposures to outdoor air, and that SVI screening should not result in extensive investigation and/or mitigation activities that may reduce indoor air exposures, but don’t ultimately reduce “screen in” sites where mitigation activities cannot reduce exposures (i.e. where indoor air concentrations resulting from SVI are no higher than unavoidable outdoor air concentrations).

Consensus opinion is that sub-slab gas samples are currently the best indicator we have of vapor phase intrusion. (There was no discussion at the workshop of the theory that sub-floor soil gas could reflect indoor sources of VOCs due to positive pressure within the structure and “outward” vapor seepage through foundation cracks.) USEPA has developed a sampling protocol that is being refined and is gaining acceptance in the scientific community. USEPA proposed a future approach of “screening in”

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sites where sub-slab samples are greater than 10 times an appropriate risk level and also greater than documented outdoor air concentrations.